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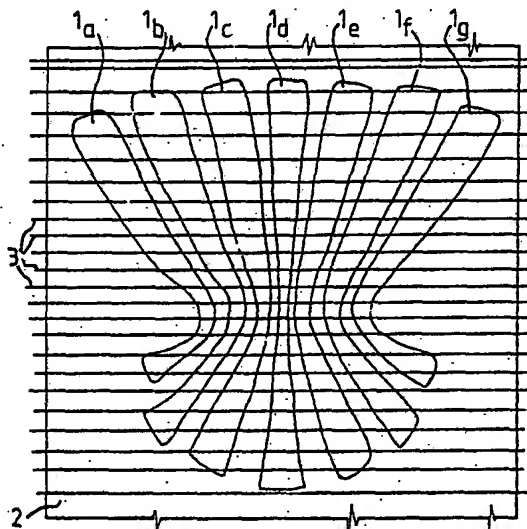
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<p>(21) International Application Number: PCT/SE90/00838</p> <p>(22) International Filing Date: 14 December 1990 (14.12.90)</p> <p>(30) Priority data: 8904317-8 21 December 1989 (21.12.89) SE</p> <p>(71) Applicant (for all designated States except US): MÖLN- LYCKE AB [SE/SE]; S-405 03 Göteborg (SE).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): WIDLUND, Leif, Ur- ban, Roland [SE/SE]; Pärönvägen 5, S-435 00 Möln- lycke (SE). HANSSON, Roy [SE/SE]; Ålegårdsgatan 112, S-431 45 Mölndal (SE).</p>	<p>(74) Agents: HJÄRNE, Per-Urban et al.; H. Albihns Patentby- rå AB, Box 3137, S-103 62 Stockholm (SE).</p> <p>(81) Designated States: AT (European patent), AU, BE (Euro- pean patent), CA, CH (European patent), DE (Euro- pean patent), DK (European patent), ES (European pa- tent), FI, FR (European patent), GB (European patent), GR (European patent), HU, IT (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent), US.</p> <p>Published With international search report.</p>	

(54) Title: A METHOD FOR THE FLAT MANUFACTURE OF THREE-DIMENSIONAL ARTICLES, PARTICULARLY ABSORBANT, DISPOSABLE ARTICLES, AND AN ARTICLE PRODUCED IN ACCORDANCE WITH THE METHOD



(57) Abstract

The present invention relates to a method for the flat manufacture of three-dimensional articles, in particular absorbent disposable articles. According to the invention, a plurality of narrow, flexible absorbent bodies (1<sub>a</sub>-1<sub>g</sub>) are placed sequentially on a thin material web of liquid-impermeable material (2; 2') or liquid-permeable material, said pads having mutually diverging side surfaces on both sides of a central part of said pads intended to form the crotch parts of a manufactured article; placing a thin, second material web of liquid-permeable material (4) or liquid-impermeable material over said bodies and fastening second material web to the first material web (2; 2') so as to enclose each pad between the two material webs; and by rendering those parts of the mutually joined material webs located between the different pads contractable prior to or in conjunction with placing the liquid-permeable material web in position; and by then causing the contractable parts of the material webs to contract and therewith move the side surfaces of the pads towards one another. The invention also relates to an absorbent disposable article manufactured in accordance with the method.



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A Method for the Flat Manufacture of Three-Dimensional Articles, Particularly Absorbent, Disposable Articles, and an Article Produced in Accordance with the Method

5 The present invention relates to a method for the flat manufacture of three-dimensional articles, in particular absorbent disposable articles, and to an article produced in accordance with the method.

10 Absorbent disposable articles, such as diapers, incontinence guards and sanitary napkins, often consist of a substantially flat absorbent pad enclosed between an outer, liquid-impermeable casing layer and an inner, liquid-permeable casing layer. Such articles are mass  
15 produced, by placing absorbent pads on a moving web of material and placing a further web of material on the first mentioned web and fastening the two material webs together in regions thereof which protrude beyond the absorbent pads, whereafter a finished article is cut  
20 from the thus formed composite web. In the case of the present document, this article is considered to be flat. The human bodies on which such articles are worn, however, are anything but flat and consequently when the article is put on, the absorbent pad will deform  
25 and form folds and pleats in the article. Furthermore, it is difficult to shape such articles so that they conform to the shape of the user's body when worn. These factors contribute to an impaired function of the article, particularly with respect to leakage reliability.  
30

If this deformation and folding of absorbent, disposable articles could be eliminated or reduced and/or controlled, the risk of leakage with such articles  
35 would be reduced to a significant extent. A large



number of different constructions are known whose primary purpose is to avoid the formation of folds in sensitive regions of the article, for instance at the margins or edges of the crotch region of the article, or to provide controlled deformation of the article, for instance so that raised embankments or flaps are formed along the edge margins of the crotch part of the article. It is also known to provide such articles with patterns of pre-tensioned elastic threads or bands, so as to impart a basin-like shape to the article or parts thereof.

The object of the present invention is to solve the aforesaid problems encountered with absorbent, disposable articles, by providing an article which can be manufactured in a flat state and which, subsequent to manufacture, will assume a three-dimensional shape corresponding to the shape of the user's body.

To this end, there is proposed in accordance with the invention a method of the aforesaid kind which is characterized by placing a plurality of flat, flexible pads intended to form the three-dimensional article sequentially on a flat support surface, such that the side surfaces of at least some mutually adjacent pads will diverge from one another over at least certain sections of the bodies, and by mutually joining the side surfaces of said pads with the aid of pre-stretched contractable devices, and by subsequently permitting the devices to contract so as to convert the article from a flat state to a three-dimensional shape.

The invention also relates to an absorbent, disposable article, such as a diaper, an incontinence guard or a sanitary napkin, manufactured in accordance with said





method and comprising an absorbent pad or body enclosed between an inner and an outer casing layer. The inventive article is characterized in that the absorbent body is constructed from a plurality of elongated narrow bodies, each of which is enclosed between two casing layers which are mutually joined along parts lying externally of said bodies; and in that the side surfaces of said bodies are joined, or substantially joined, to the side surfaces of adjacent bodies at least in those parts which lie outside the crotch region of the article; and in that the article has a three-dimensional shape.

So that the invention will be more readily understood and further features thereof made apparent, the invention will now be described in more detail with reference to an exemplifying embodiment thereof illustrated in the accompanying drawings, in which

Figure 1 illustrates one stage in the inventive manufacture of a first embodiment of an inventive diaper;

Figure 2 shows the diaper of Figure 1 when manufacture is completed; and

Figure 3 illustrates the same step as that in Figure 1 in the manufacture of a diaper according to another embodiment of the invention.

Figure 1 illustrates the step in the manufacture of an inventive diaper prior to applying a liquid-permeable casing layer. As shown in the Figure, the absorbent pad of the diaper is comprised of a number of elongated, narrow flat bodies  $1_a-1_g$  made of an absorbent material, for instance cellulose fluff, which may be admixed with



so-called superabsorbents and/or melt fibres. In the case of the Figure 1 embodiment, the bodies  $1_a-1_g$  have been placed, in a first manufacturing step, on a web of liquid-impermeable material 2 in the pattern illustrated in Figure 1, said liquid-impermeable material forming an outer casing layer or backing sheet of the finished article. A plurality of transverse, stretched elastic threads 3 have then been placed on the bodies  $1_a-1_g$  in a second manufacturing step.

The stage of manufacture illustrated in Figure 1 has now been reached. In order to obtain a finished diaper from the configuration illustrated in Figure 1, all that remains is to apply a web of liquid-permeable material 4 (not shown in Figure 1) such as to form an inner casing layer of the finished article, and to secure this material web to the material web 2 in regions lying outside the bodies  $1_a-1_g$ , and attach fastener tabs 5 (not shown in Figure 1) and then cut the finished article from the composite web. The material webs are preferably joined together with the aid of glue coated on one or on both of said webs over the whole of its surface or over parts thereof.

When the article is cut from the composite web, the elastic threads 3 will contract in those parts which lie outside the bodies  $1_a-1_g$ . No appreciable contraction of the elastic threads will take place in those parts of the threads which extend over the bodies  $1_a-1_g$ , owing to the stiffness or rigidity of these bodies. Thus, those parts of the mutually joined, thin casing layers 2, 4 located between the bodies  $1_a-1_g$  will be folded or pleated between said bodies and the side surfaces of said bodies will be moved towards one another.



As will be seen from Figure 1, the adjacent side surfaces of the bodies  $1_a-1_g$  will diverge away from one another on both sides of a central transverse part which forms the crotch part of the diaper in use. This means that the bodies are forced to curve out of the plane illustrated in Figure 1 (the plane of the paper) in order for the side surfaces to be brought towards one another. It will be seen that if the side surfaces are straight, the joining line will also be straight and lie in a plane which is inclined to the original plane of the bodies. When the side surfaces are composed along their lengths from straight parts with varying directions, it will be seen that the joining line will extend in a plurality of mutually different inclined planes. It will also be seen against this background that if the side surfaces are curved between said parts of varying directions, the joining line will also be curved between its straight parts, while if the side edges are arcuate in their entirety, the joining line will also be arcuate.

Figure 2 illustrates the diaper of Figure 1 in its final state. Thus, it will be seen that a diaper whose shape corresponds to the shape of a baby's or child's bottom can be produced by appropriate configuration of the bodies or pads  $1_a-1_g$  and appropriate positioning of said bodies or pads in relation to one another.

Figure 3 illustrates the same manufacturing step as that shown in Figure 1 but in connection with a second embodiment of an inventive diaper. This embodiment differs from the embodiment according to Figures 1 and 2, in that the bodies  $1'_a$ ,  $1'_c$  and  $1'_g$  have been placed on top of the elastic threads  $3'$  within the region A.



This is achieved by first placing the bodies 1'<sub>b</sub>, 1'<sub>d</sub> and 1'<sub>f</sub> onto the material web 2' and then placing the threads 3' located within the region A, which corresponds to the crotch region of a finished diaper, on top of said bodies. The remaining bodies 1'<sub>a</sub>, 1'<sub>c</sub>, 1'<sub>e</sub> and 1'<sub>g</sub> and the remainder of the elastic threads 3' are then placed in position. In other respects, the manufacture of the diaper according to this second embodiment of the invention is effected in the same manner as that described with reference to the diaper illustrated in Figures 1 and 2.

The elastic threads 3' present within the crotch part of a thus manufactured diaper will strive to bring together the upper and lower edges of the side surfaces of adjacent bodies, whereas the elastic threads 3' in remaining parts of the diaper will strive to bring together the upper sides of the side surfaces of adjacent bodies. Thus, the elastic threads in the crotch part of the diaper will strive to bring the bodies 1'<sub>b</sub>, 1'<sub>d</sub> and 1'<sub>f</sub> to a lower level than the bodies 1'<sub>a</sub>, 1'<sub>c</sub>, 1'<sub>e</sub> and 1'<sub>g</sub>. This is made possible because the bodies located within the crotch part of the diaper can be displaced into mutually overlapping relationship when putting the diaper onto a child wearer. This affords two important advantages. The first advantage is that the bodies 1'<sub>a</sub>-1'<sub>g</sub> can be made wider in the crotch part of the diaper than would otherwise be the case, therewith increasing the strength of the diaper in the region thereof subjected to the heaviest loads in use, while the second advantage is that more absorbent material can be used in that part of the diaper where most liquid collects. Furthermore, the dispersion of liquid from the crotch part is improved with a diaper of this configuration,





since more bodies or pads are active in this liquid dispersion process.

5 It will be understood that an elastic casing material can be used instead of elastic threads for the purpose of rendering the outwardly lying parts of the casing materials contractable. One particularly suitable material in this regard is film having a so-called elastic memory, for instance different types of Exxon  
10 Extraflex, i.e. a plastic material which can be greatly extended under plastic deformation, so that its extension will remain subsequent to removing the load but which when subsequently heated will return to its original size and therewith possess elastic properties  
15 within the region between its original size and its extended size. Shrink film or combinations of shrink film and elastic material are also conceivable for use in providing contractable parts.

20 It is in this respect pointed out that the elasticity of the finished diaper is primarily intended to enable the diaper to fit the bottoms of children of different sizes, and to form waist elastication.

25 When the invention is applied in the manufacture of three-dimensional absorbent disposable articles, there is obtained, in addition to the aforesaid good properties with respect to leakage reliability and shape conformity, which are conducive with the three-  
30 dimensional shape, the further advantage of decreasing the risk of the absorbent bodies lumping together, this advantage being conducive with the division of the absorbent body or pad into several, mutually separate bodies or pads. Furthermore, any lumping together of an  
35 inventive absorbent pad will present less of a problem



than the same occurrence in a conventional absorbent pad, since the lumping together of a separate inventive pad will not influence the longitudinal dispersion of liquid in adjacent pads.

5

It will be understood that the illustrated embodiments can be modified in several ways within the scope of the invention, particularly with regard to the shape of the bodies and the kind of article in which the invention is applied. Furthermore, in other applications of the invention than those of the exemplifying embodiments, the separate pads can be placed closer together than in the pattern illustrated in Figure 1, in which inter-spaces between the pads must always be present in order to enable the pads to swell when absorbing liquid. It will also be understood that the invention can be solely applied in the manufacture of the backing piece of a diaper, which is then secured to a separate front piece manufactured in a conventional manner, since the front piece of the diaper when worn will have a substantially flat form. The invention is, therefore, solely restricted to the content of the following Claims.

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Claims

1. A method for the flat manufacture of three-dimensional articles, characterized by placing  
5 a plurality of flat, flexible bodies intended to form the three-dimensional article sequentially on a flat support surface, such that the side surfaces of at least some of the mutually adjacent bodies will diverge away from one another at least in certain sections of  
10 said bodies; by mutually connecting the side surfaces of said bodies with the aid of extended or stretched contractable devices; and permitting the contractable devices to contract such as to convert the article from a flat state to a three-dimensional configuration.

15 2. A method for the flat manufacture of absorbent, disposable articles of three-dimensional configuration, characterized by placing a plurality of elongated, narrow and flexible absorbent pads ( $1_a-1_g$ ;  
20  $1'_a-1'_g$ ) sequentially on a thin first material web of liquid-impermeable material (2; 2') or liquid-permeable material, said pads having mutually diverging side surfaces on both sides of a central part of said pads intended to form the crotch parts of a manufactured  
25 article; placing a thin, second material web of liquid-permeable material (4) or liquid-impermeable material over said bodies and fastening second material web to the first material web (2; 2') so as to enclose each pad between the two material webs; and by rendering  
30 those parts of the mutually joined material webs located between the different pads contractable prior to or in conjunction with placing the liquid-permeable material web in position; and by then causing the contractable parts of the material webs to contract and



therewith move the side surfaces of the pads towards one another.

5 3. A method according to Claim 2, c h a r a c -  
t e r i z e d by placing the side surfaces of the  
elongated, narrow and flexible absorbent pads ( $1_a-1_g$ ;  
 $1'_a-1'_g$ ) in spaced relationship with the side surfaces  
of adjacent pads over the whole lengths of said pads.

10 4. A method according to any one of Claims 1 to 3,  
c h a r a c t e r i z e d by joining the side surfaces  
of the bodies ( $1_a-1_g$ ;  $1'_a-1'_g$ ) to the side surfaces of  
adjacent bodies with the aid of pre-stretched elastic  
material.

15 5. A method according to Claim 4, c h a r a c -  
t e r i z e d in that the pre-stretched elastic mate-  
rial comprises film possessing an elastic memory and/or  
shrink film.

20 6. An absorbent disposable article, such as a diaper,  
an incontinence guard or a sanitary napkin, comprising  
an absorbent body enclosed between an inner and an  
outer casing layer, c h a r a c t e r i z e d in that  
25 the absorbent body is comprised of a plurality of  
elongated narrow bodies ( $1_a-1_g$ ;  $1'_a-1'_g$ ) of absorbent  
material, each of said bodies being enclosed between  
two casing layers (2, 4; 2') which are mutually joined  
at parts which lie externally of said bodies; and in  
30 that the side surfaces of said bodies are joined, or  
substantially joined to the side surfaces of adjacent  
bodies at least in those parts which lie outside the  
crotch region of the article; and in that the article  
has a three-dimensional shape.

35





7. An article according to Claim 6, c h a r a c -  
t e r i z e d in that the casing layers (2, 4; 2') are  
elastic in those parts which lie between said absorbent  
bodies, at least in the parts which lie outside the  
crotch region of the article.

8. An article according to Claim 7, c h a r a c -  
t e r i z e d in that the casing layers include inter-  
mediate elastic threads (3') or bands which are mounted  
in a stretched state and which extend transversely from  
one side of the article to the other on top of the  
absorbent bodies (1'<sub>a</sub>-1'<sub>g</sub>) in parts of the article  
which lie externally of the crotch region (A) and  
extend alternately over and under the bodies within the  
crotch region (A) of said article.



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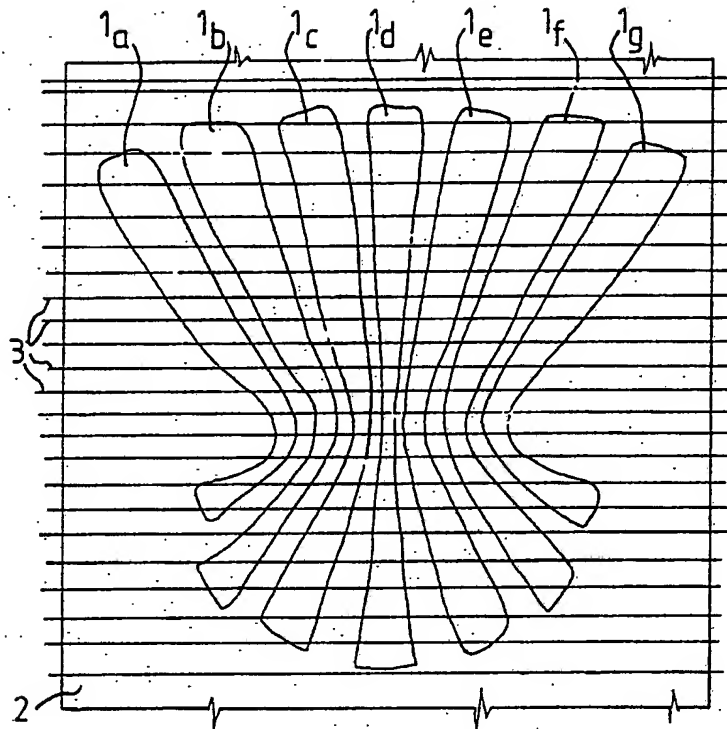


FIG. 1

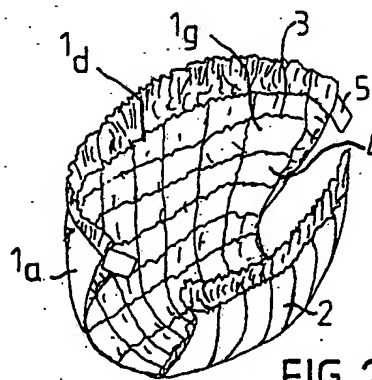


FIG. 2



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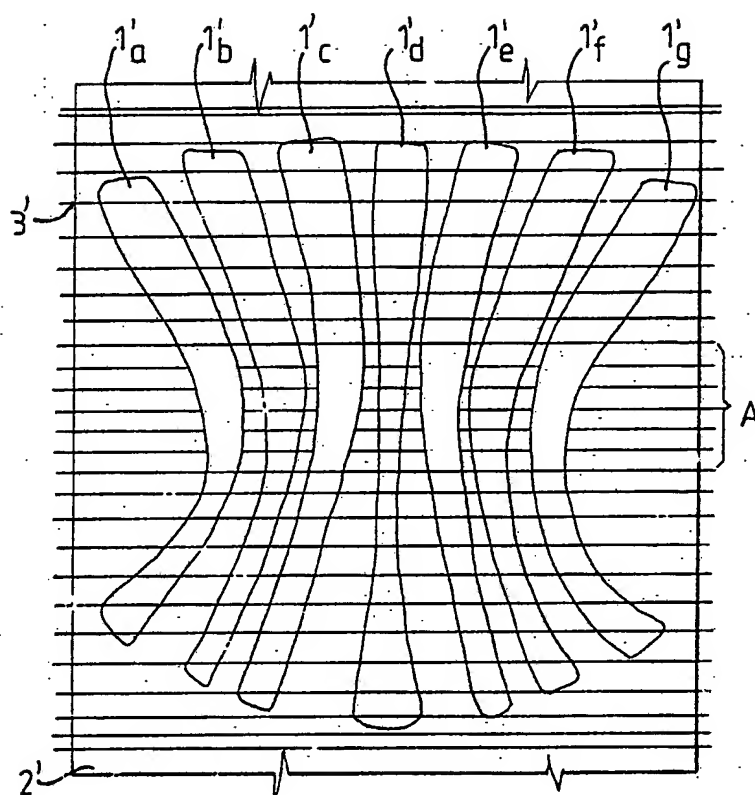
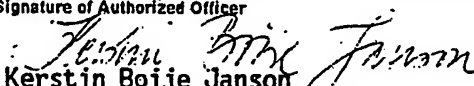


FIG. 3



# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 90/00838

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <b>IPC5: A 61 F 13/15</b>						
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border: 1px solid black; padding: 2px;">Minimum Documentation Searched<sup>7</sup></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 20%; border: 1px solid black; padding: 2px;">Classification System</th> <th style="border: 1px solid black; padding: 2px;">Classification Symbols</th> </tr> <tr> <td style="border: 1px solid black; padding: 5px; vertical-align: top;">IPC5</td> <td style="border: 1px solid black; padding: 5px; vertical-align: top;">A 61 F</td> </tr> </table> <div style="text-align: center; border: 1px solid black; padding: 2px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched<sup>8</sup></div>			Classification System	Classification Symbols	IPC5	A 61 F
Classification System	Classification Symbols					
IPC5	A 61 F					
SE,DK,FI,NO classes as above						
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>						
Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>				
X	US, A, 4735624 (PAUL MAZARS) 5 April 1988, see the whole document --	1				
A	SE, B, 450454 (MÖLNLYCKE AB) 29 June 1987, see figure 10 --	1-8				
A	US, A, 4642110 (EVELIN DUDEK) 10 February 1987, see the whole document -- -----	1-8				
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>						
<b>IV. CERTIFICATION</b>						
Date of the Actual Completion of the International Search  <b>20th March 1991</b>	Date of Mailing of this International Search Report  <b>1991 -03- 22</b>					
International Searching Authority  <div style="text-align: center;"><b>SWEDISH PATENT OFFICE</b></div>	Signature of Authorized Officer <div style="text-align: center;">   <b>Kerstin Boije Janson</b> </div>					





**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 90/00838**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on 91-02-28.  
The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4735624	88-04-05	EP-A-B- 0227513	87-07-01
		FR-A-B- 2590125	87-05-22
SE-B- 450454	87-06-29	AU-B- 589922	89-10-26
		AU-D- 5037485	86-06-05
		CA-A- 1261102	89-09-26
		EP-A-B- 0183668	86-06-04
		JP-A- 61132601	86-06-20
		SE-A- 8406071	86-05-31
		US-A- 4692163	87-09-08
US-A- 4642110	87-02-10	NONE	

